

Dutch S. S. *Nickerie*:

Gale began on the 19th, wind S. Lowest barometer 29.74 inches at 7 a. m. on the 20th, wind SSE., in latitude 29° 11' N., longitude 23° W. End on the 20th, wind SW. Highest force of wind 9, S.; shifts S.-SSE.

On the 20th and 21st the second severe "norther" of the month occurred in the Gulf of Mexico; this reached its greatest intensity on the 21st, and the daily weather map for that date shows a barometric reading of 30.58 inches at Galveston and 29.92 inches at Swan Island. While the gradient between these two stations was not as steep as on the 6th, the force of the wind was apparently as high. The Greenwich mean noon observations from a number of vessels give northerly winds, force 7-9, with barometric readings ranging from 30.14 to 30.44 inches.

Storm log:**American S. S. *Pennsylvania*:**

Gale began on the 20th, wind NE. Lowest barometer 30.01 inches at 6 a. m. on the 20th, wind NE. 8, in latitude 23° 35' N., longitude 88° 20' W. End on the 22d, wind N. Highest force of wind 9, N.; shifts NE.-N.

On the 25th New York was near the center of a disturbance that moved northeastward, and on the 27th was central in the vicinity of St. Johns, Newfoundland; during this period gales were reported by vessels west of the 50th meridian, as shown by following storm log:

American S. S. *Lightburn*:

Gale began on the 25th, wind SW. Lowest barometer 29.45 inches at 7 a. m. on the 25th, wind SSW. 10, in latitude 39° 38' N., longitude 69° 54' W. End on the 27th, wind NW. Highest force of wind 10, SSW.; shifts 6 points.

On the 25th and 26th there was a shallow depression near latitude 35° N., longitude 35° W., with gales in the westerly quadrants. Storm log:

British S. S. *Bloomfield*:

Gale began on the 24th, wind ESE. Lowest barometer 29.86 inches at 2 p. m. on the 25th, wind W., in latitude 36° 10' N., longitude 36° 42' W. End on the 26th, wind NNW. Highest force of wind 9, NW.; shifts WNW.-NW.-NNW.

On the 29th and 30th an area of low pressure was evidently central somewhere in the vicinity of Iceland, although it was impossible to locate it accurately on account of lack of observations. On the 29th westerly to southerly gales swept the steamer lanes east of the 50th meridian, while by the 30th the storm area had contracted considerably.

On the 31st Bermuda was about 10° west of the center of a LOW, and vessels between the 45th and 60th meridians reported unusually heavy winds.

Storm log:**British S. S. *Caldy Light*:**

Gale began on the 30th, wind SE. Lowest barometer 29.60 inches at 3 p. m. on the 31st, wind SE. 10, in latitude 36° 04' N., longitude 51° 05' W. End on February 1, wind NW. Highest force of wind 10, SE.; shifts SSE.-S.-SW.

SOUTH ATLANTIC OCEAN.

By ALBERT J. McCURDY, Jr.

Weather reports received from vessels that were in the South Atlantic Ocean in January, 1924, indicate that stormy conditions prevailed off the coast of Brazil in the first and middle decades of the month.

The Dutch S. S. *Poeldijk*, Captain Yaski, proceeding from Rotterdam to Buenos Aires, encountered on January 8, while off the southern coast of Brazil, fresh to strong gales with overcast weather and rough seas.

Mr. P. Smit, observer, states that the lowest pressure observed was 756 mm. (29.76 inches), this occurring at 4 p. m. in 26° 40' S., 47° 41' W. The wind at the time was SSW., force 8, increasing at 1 p. m. to force 9, followed by a heavy rain shower. Gale ended on the 9th, wind SW.

On the same date the American S. S. *F. Q. Barstow*, Capt. H. Wallace, New York toward Buenos Aires, experienced a moderate gale with rough seas in 35° S., 54° 30' W. Observer H. C. Strong reports that the lowest pressure, 29.97 inches (corrected), was observed at 8:24 a. m., at which time the wind was SSW., force 7.

On January 9 a fresh gale was encountered by the Dutch S. S. *Bellatrix*, Capt. C. Spuy, Cardiff toward Buenos Aires. Second Officer A. Barendrecht reports that at 9:15 a. m., while in 22° 45' S., 41° 15' W., the barometric reading was 29.76 inches (corrected); wind S., force 5, increasing to a fresh gale after sunset. The lowest pressure observed was 29.47 inches (corrected). This occurred at 10 p. m. and was followed by a heavy thunderstorm. The weather cleared on the morning of the 10th.

On the 15th the American S. S. *Kenowis*, Capt. E. A. Schaefer, proceeding from Port Arthur to Montevideo, experienced winds of gale force off the southern coast of Brazil. Second Officer William McFaul reports rough northeast seas with overcast and squally weather. The lowest pressure, 29.81 inches (corrected), was observed at 8:43 a. m. 29° 20' S., 49° 10' W. The wind at this time was NE., force 7.

551.506 (265.2)

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

The weather over the North Pacific Ocean during January, 1924, exhibited wide extremes of intensity, as noticed by mariners during entire transoceanic voyages. On the one hand, Mr. C. H. Moen, observer and fourth officer on board the American S. S. *President Jefferson*, Capt. F. R. Nichols, Seattle to Yokohama from the 23d to the 31st of the month, has the following to remark:

This has been a most remarkable voyage. We made the run in 10 days and 5 hours, arriving in Yokohama over 12 hours ahead of schedule. It is rare to find no storm, no fog, and smooth seas for this time of the year. A few snow squalls were encountered, but they never lasted more than a few minutes at the most.

On the other hand is the record of strong gales to hurricane winds, and the violent seas which caused more than one stout vessel to heave to for hours at a time, awaiting an abatement of the storm.

The pressure system showed the Aleutian LOW to be existent throughout the month, although fluctuating considerably in area and intensity. The eastern North Pacific HIGH seems to have been less well developed than usual, and persisted on few consecutive days. Two storms from low latitudes entered the area between Hawaii and California, and southward extensions of the Aleutian cyclone occupied much of the usual high pressure region during most of the last decade. However, at the close of the month the HIGH was becoming well established along the 30th parallel to the eastward of the 160th meridian of west longitude. A strong anticyclone overlay northern Alaska from the 20th to the 25th.

In east longitudes high pressure prevailed over the China coast, and the northeast monsoon seems to have been active. No reports of typhoons are at hand. Greater storm activity, however, occurred in east than in west longitudes during January, and moderate to dangerous gales were of frequent occurrence over the

middle and northern steamship routes of the western Pacific between the 25th and 50th parallels.

The mean monthly pressure at Dutch Harbor, which is generally regarded as indicating the intensity of the Aleutian LOW, was 29.50 inches, as compared with the average January pressure of 29.71. This comparison is based on p. m. observations. On the same basis, pressure in the Aleutian area has not exceeded the average since February, 1923, a period of 11 months. In the present January pressure was continuously low from the 1st to the 13th and from the 23d to the 30th. The highest reading, 30.10, was recorded on the 21st; the lowest, 28.76, on the 13th. Absolute range, 1.34 inch. At Honolulu conditions were about the reverse of those at Dutch Harbor. Pressure was high from the 1st to the 10th and after the 23d; low during the intermediate period. The average of p. m. observations was 30.04, or 0.03 inch above normal. The highest reading, 30.19, was recorded on the 28th; the lowest, 29.80, on the 18th. Pressure at Midway Island was without marked features, averaging normal, or 30 inches (29 days). The highest, reading, 30.20, was recorded on the 4th; the lowest, 29.80, on the 25th.

At Honolulu quiet conditions prevailed, although a few high-pressure gales occurred during the early part of the month, particularly on the 6th, when a maximum velocity of 46 miles an hour from the east was registered. There was less cloudiness than during any other month since the record began in 1904, and three-fourths of the daylight hours were sunny. Only 0.12 inch of rainfall occurred—this being the least of any month since the beginning of precipitation records in 1877.

Storm conditions over the ocean began with a hurricane wind on the 1st and ended with a whole gale on the 31st, with 15 intermediate days on which seamens' reports show forces of 11 to 12.

The British S. S. *Canadian Transporter*, eastward bound, after weathering a hurricane on December 27, encountered another on January 1, in latitude 48° 10' N., longitude 177° 40' W., lowest pressure 28.88 inches. Gales as high in force as 10 were observed by other vessels on this date between 40° and 50° N., 160° W. and 160° E.

On the 2d and 3d the American S. S. *President McKinley*, westward bound, passed through the same cyclone, experiencing the highest wind, force 11 from the west by south, and noting the lowest pressure, 28.81 inches, in latitude 52° 25' N., longitude 167° 45' W.

On the 3d and 4th this widespread storm seems to have attained its maximum energy. The center at this time was to the westward of that of the two earlier days, being near 47° N., 170° E.

The Panaman S. S. *Ida* during the first eight days of the month had a tempestuous voyage from the Orient toward British Columbia. On the 1st, in 45° 23' N., 162° E., she was in a west-northwesterly gale, force 10, pressure 29 inches. The rough seas and intermittent gales continued through the 2d. On the 3d she encountered hurricane winds, with pressures generally below 29, the minimum being 28.74. On the 4th the vessel proceeded in hurricane winds for about half the day, accompanied by heavy rain and snow squalls, her position now being near 47° 28' N., 173° E. On the 5th the gales continued until she crossed the 180th meridian. Early on the 6th there was a lull, during which time pressure fell rapidly. On the morning of the 7th a whole gale from the east-northeast was blowing, and at noon, in 48° 03' N., 169° 33' W., the pressure had fallen to 28.24 inches, the lowest recorded for the North Pacific during the month.

While most of the northern part of the ocean was disturbed by the Aleutian cyclone, low pressure developed on the 3d near 40° N., 140° W., and caused gales of forces 8 and 9 along the United States-Honolulu routes. This disturbance disappeared to the northward on the 4th.

On the 7th, while the deepest cyclone of the month was prevailing to the southward of Dutch Harbor, a storm which gave a west wind of force 9 at Nemuro was crossing northern Japan. It caused some gales at sea, but was followed on the 10th by a more widespread disturbance which affected much of the ocean from the east coast of Japan to the Aleutian area, and north and south from the 30th to the 50th parallels, giving whole gales to storm winds on the 10th, 11th, and 12th.

Many vessels were involved in the turbulent conditions of this period. Those reporting winds of force 11 were the American steamships *Anna E. Morse* and the *Memphis City*. The *Anna E. Morse*, westward bound, experienced the worst of the gale from the northwest on the 10th and 11th near 46° N., 170° to 174° E., lowest pressure 28.68, on the 12th. The *Memphis City*, steaming westward along the southern edge of the cyclone, in latitude 30° 40' N., longitude 168° 20' E., with lowest pressure at 29.71 inches, nevertheless encountered a west-northwesterly gale, force 11, with seas so tremendous that she heaved-to and used oil to calm the waves.

The next stormy period was that of the 15th and 16th. Although scattered gales of moderate force occurred along the California and northern Japanese coasts, and in isolated regions elsewhere, the main energy of the winds appeared over middle longitudes from the Alaskan Peninsula southward, as indicated. The highest wind force recorded was 11, noted on the 15th by the following vessels: The American S. S. *West Cayote*, wind southwest, lowest pressure 29.55, in 52° 12' N., 164° W.; the American S. S. *West Islip*, wind northwest, lowest pressure 29.16, in 35° 34' N., 178° W.; and the Norwegian S. S. *Eriken*, wind northwest, lowest pressure 29.58 (uncorrected), in 34° 41' N., 173° 09' E. On the 16th the American S. S. *Anna E. Morse* encountered a northwesterly gale, force 11, lowest pressure 29.19, in 41° 18' N., 154° 16' E.

On the 15th and 16th a depression appeared slightly to the eastward of Hawaii, and on the 18th gave Honolulu the lowest pressure of the month. It possessed no great energy, although gales of force 8 were noted on the 20th and 22d by vessels within latitudes 27° to 40° N., longitudes 145° to 160° W. The low seems finally to have pursued a north-northwesterly course and mingled with the Aleutian disturbance to the southeastward of Dutch Harbor on the 23d.

During the last decade of the month stormy weather as a rule was of insufficient violence to greatly disturb vessels plying the waters to the eastward of the 170th meridian of west longitude. Only one vessel in this area reported a wind force exceeding 9. This was the Japanese S. S. *Hayo Maru* which enroute toward Coos Bay, fell in with a south-southeast hurricane, lowest pressure 29.48, on the 26th, in 44° 05' N., 129° 55' W. The center of this storm lay over the southern portion of the Gulf of Alaska, whence it had drifted from the central Aleutians. An offshoot entered the British Columbian coast on the 26th-27th.

To the westward of 170° W. much violent weather occurred during the 21st to 31st. On the 21st the American S. S. *West Niger*, while in 37° 47' N., 161° 25' E., encountered westerly squalls of hurricane force, lowest pressure 29.16 inches. On the 22d the British S. S. *Tascalusa*, in 36° 50' N., 152° 50' E., met frequent

hurricane squalls, with wind blowing constantly from the northwest. On these two days gales of force 10 to 12 covered the area between 150° and 170° E., 30° and 50° N.

On the succeeding days of the month storm to hurricane winds were reported as follows: On the 24th, by the American S. S. *West Niger*, NW. 11, lowest pressure 29.35 inches, in 36° 41' N., 152° 33' E.; on the 25th, by the Japanese S. S. *Manila Maru*, NE. 11, lowest pressure 29.39, in 44° 19' N., 159° 34' E.; on the 27th, by the American S. S. *West Chopaka*, NW. 11, lowest pressure 29.35, in 37° 19' N., 148° 04' E.; on the 31st, by the American S. S. *Dilworth*, SE. to WSW. 11, lowest pressure 28.88, in 34° 58' N., 156° 16' E.

From the two foregoing paragraphs, it will be seen by how narrow a margin of escape from preceding and subsequent rough weather did the *President Jefferson*, previously mentioned, day by day make her remarkable, storm-free voyage.

Attention must be directed to the area lying along the canal route between the 85th and the 100th meridians. Unusual storm conditions prevailed from the 5th to the 9th throughout this region, the winds becoming especially violent on the 6th and 7th over the Gulf of Tehuantepec. The American S. S. *Steel Scientist*, southward bound, commented as follows:

January 5. Encountered a wind from NNE. in latitude 14° 56' N., longitude 96° 32' W., barometer 29.91. Constant blow from NNE., reaching up to force 11, lowest barometer 29.81 on the 6th, in 14° 44' N., 96° 06' W. Ended Jan. 7 in latitude 13° 06' N., 93° 53' W., barometer 29.97. On the 7th encountered a wind from the E., barometer 29.80, in latitude 10° 01' N., longitude 88° 23' W.

The American S. S. *D. G. Schofield*, southward bound, experienced a hurricane from the northeast at 1 p. m. of the 6th, lowest pressure 29.96, in 15° 09' N., 94° 27' W. The gale continued to be experienced by the vessel until well into the 7th when, at 6 a. m., the wind was north-northwest 9, pressure 29.98, in 13° 27' N., 93° 58' W. On the 8th and 9th other gales were encountered, the highest force being 9 from the northeast, on the 9th, lowest pressure 29.85, in 10° 06' N., 87° 31' W. Several other vessels noted gales of force 8 to 10 at this time.

On the 20th to 23d high winds, though not exceeding 10 in force, occurred in the same region. The American S. S. *W. S. Rheem* early on the 21st was in a northwesterly gale, force 10, pressure 29.82, in 15° 52' N., 93° 54' W., and the American S. S. *Hampton Roads* on the 23d experienced a northeasterly gale, force 8, in 9° 42' N., 86° 11' W.

During the prevalence of these storms a strong norther occurred over the Gulf of Mexico.

Fog occurred more frequently in January than during the preceding month. On the China coast the phenomenon was noted on the 13th to 16th. Along northern and middle latitudes in west longitudes fog occurred on several days. None was reported from east longitudes, except as noted. Fog showed a considerable increase along the American coast, and was frequently observed outside the harbors of Seattle, San Francisco, and San Diego. One record comes from 10° 43' N., 90° 19' W., where it was observed on January 12 over a cool current of water.

DETAILS OF THE WEATHER IN THE UNITED STATES.

551.506 (73)

GENERAL CONDITIONS.

ALFRED J. HENRY.

The month was cold and generally dry, the drought being most pronounced on the Pacific coast and thence eastward to the Rocky Mountains; precipitation was in excess of the normal over a narrow strip extending from the East Gulf States northeastward to New England (see inset chart of Chart IV).

The defect in temperature was due to the passage of four vigorous anticyclones across the country. The usual details follow.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

The month of January showed an increase in activity over the preceding month, particularly in the number and strength of the high-pressure areas. Twelve of the latter made their appearance in the Canadian Northwest and half of these followed a well-defined path southeastward down the Missouri Valley and thence eastward or east-northeastward to the Atlantic coast. During the evening of the 4th and the morning of the 5th there were two separate high-pressure areas with barometer reading over 31 inches, one nearly stationary over the northern Plateau and Rocky Mountain region and the other moving southeast over the middle and lower Missouri Valley.

The Alberta type was the most frequent low charted; but the more important storms of the month developed over southwestern districts.

FREE-AIR SUMMARY.

By L. T. SAMUELS, Meteorologist.

The outstanding feature of Table 1 is the subnormal monthly mean temperature at all stations and practically all levels. The most severe cold wave of the month occurred on the 4th and 5th. During this period minimum temperatures exceeded all previous January records at most of the aerological stations. At Ellendale the lowest temperature for the month, -39° C. (-38° F.), occurred at 3,500 m. and at Drexel, -26° C. (-15° F.), at 2,500 m. on the 4th; at Broken Arrow, -22° C. (-8° F.), at 650 m.; at Groesbeck, -10° C. (14° F.), at 1,050 m., and at Royal Center, -33° C. (-27° F.), at 900 m. on the 5th.

It is of interest to note some of the changes in the free air over Ellendale as shown by the kite records of these two dates (4th-5th). These are shown in the following table:

Free-air conditions above Ellendale, N. Dak., on January 4-5, 1924.

[Altitude (meters) above sea level.]

	Date.	Surface 444.	1,000	1,500	2,000	2,500	3,000	3,500
Temperature (°C.)	4	-31.0	-33.9	-33.5	-33.7	-34.6	-36.7	-38.9
	5	-31.8	-18.4	-15.7	-14.9	-13.6	-12.3	-11.6
Relative humidity (per cent.)	4	81	89	88	86	84	84	84
	5	83	48	29	17	21	25	29
Vapor pressure (mb.)	4	0.26	0.22	0.23	0.22	0.20	0.16	0.13
	5	0.27	0.59	0.46	0.29	0.40	0.53	0.66
Wind direction and velocity (m. p. s.)	4	NW.	N.	N.	N.	N.	N.	N.
	5	7.6	16.5	16.6	17.4	18.6	19.1	19.6
		SSW.	W.	WNW.	NW.	NNW.	NNW.	N.
		5.8	8.4	8.5	9.6	14.2	18.7	22.5